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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/551,359

10/03/2008

Yi Xiong

577132000200

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25225 7590 09/30/2010

MORRISON & FOERSTER LLP  
12531 HIGH BLUFF DRIVE  
SUITE 100  
SAN DIEGO, CA 92130-2040

EXAMINER

FINDLEY, CHRISTOPHER G

ART UNIT

PAPER NUMBER

2621

MAIL DATE

DELIVERY MODE

09/30/2010

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/551,359	<b>Applicant(s)</b> XIONG ET AL.	
	<b>Examiner</b> CHRISTOPHER FINDLEY	<b>Art Unit</b> 2621	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-10 is/are pending in the application.  
     4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
     a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>2/01/2008, 6/16/2010</u> . | 6) <input type="checkbox"/> Other: ____.  |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. **Claims 1-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zakhor et al. (US 5699121 A, hereinafter referred to as “Zakhor”) in view of Vleeschouwer (US 20020114393 A1).**

Re **claim 1**, Zakhor discloses a method for encoding a residual image using basis functions from an overcomplete library, said method comprising the steps of: a) obtaining the residual image, said residual image having a size and an energy (Zakhor: column 4, lines 31-41, the motion prediction signal is subtracted from the video signal to produce a motion residual signal); and b) decomposing said residual image into a list of one or more atoms, each atom representing a basis function from the overcomplete library (Zakhor: column 5, lines 9-28, motion residual input patterns are compared to patterns in a library to find the closest match and determine a weighting factor, wherein the specific pattern, the weighting coefficient, and the exact position within the image describe an atom), said step of decomposing said residual image including the steps of: i) identifying a replacement region in the residual image for representation by an atom using a residual energy segmentation algorithm (Zakhor: column 5, lines 29-39, dividing motion residual signal into seek blocks); ii) creating a subset of basis functions from the

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overcomplete library, each basis function in the subset matching with the replacement region within a predetermined threshold (Zakhor: column 9, lines 26-37); iii) identifying an atom within the subset of basis functions, said atom for representing the replacement region and said atom having parameters (Zakhor: column 9, lines 16-22, matching pursuit used to match pattern library of basis structures to energy patterns in motion residual); iv) quantizing said atom and modifying the parameters of the atom into a form suited for encoding (Zakhor: column 6, lines 25-26, atom coder performs quantization); v) encoding said quantized atom (Zakhor: column 6, lines 25-26, atom coder performs variable length coding VLC), subtracting said atom from the replacement region in the residual image thereby reducing the energy of the residual image (Zakhor: column 10, lines 36-60); and vi) comparing the reduced size of the residual image or the reduced energy of the residual image with a predetermined criteria and repeating steps (i) to (vi) until the predetermined criteria is achieved (Zakhor: column 10, lines 36-60, the next stage residual is generated from the subtraction operation; column 8, lines 21-31, the procedure is repeated iteratively until an energy threshold is reached); thereby encoding said residual image and reducing the size thereof to a predetermined level (Zakhor: column 8, lines 21-31, the procedure is repeated iteratively until an energy threshold is reached).

Zakhor does not specifically disclose using a quadtree-based atom coder to reduce the size of the residual image. However, Vleeschouwer discloses a method and apparatus for adaptively encoding framed data sequences, wherein the procedure includes the use of first and second sub-encoding steps (Vleeschouwer: paragraph

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[0075]), and the sub-encoding methods can be based on matching pursuits and tree coding such as quadtree (Vleeschouwer: paragraph [0088]). Since Zakhor and Vleeschouwer both relate to performing adaptive block-by-block coding schemes, one of ordinary skill in the art at the time of the invention would have found it obvious to include the first and second sub-encoding steps of Vleeschouwer with the atom based coding of Zakhor in order to take advantage of multiple coding optimization schemes so that bandwidth and buffer constraints may be met while maintaining the highest visual quality possible.

Re **claim 2**, Zakhor discloses that the step of identifying an atom within the subset of basis functions is performed using a progressive elimination algorithm (Zakhor: column 8, lines 21-29, matched patterns are eliminated so that remaining high energy patterns can be processed).

Re **claim 3**, Zakhor discloses that the step of identifying a replacement region comprises the generation of a RESA rectangle (Zakhor: column 5, lines 29-40).

Re **claim 4**, Zakhor discloses that the step of identifying a replacement region comprises identification of an initial region within the residual image having a highest energy, and growing the RESA rectangle therefrom (Zakhor: column 5, lines 29-40).

Re **claim 5**, Zakhor discloses that the step of identifying an atom within the subset of basis functions comprises determining an inner product between a basis function and the replacement region, wherein a maximum absolute value of the inner product indicates a best match (Zakhor: column 7, lines 61-67).

Re **claim 6**, Zakhor discloses that the RESA rectangle is compared to the basis functions within the overcomplete library and the basis functions that are sufficiently match the RESA rectangle are placed in the subset of basis functions (Zakhor: column 5, lines 46-58).

Re **claim 7**, Zakhor discloses that the progressive elimination algorithm removes basis functions from the subset of basis functions by comparing a basis function currently being evaluated with a previously evaluated basis function (Zakhor: column 8, lines 21-29, matched patterns are eliminated so that remaining high energy patterns can be processed).

Re **claim 8**, Zakhor discloses that the step of quantizing the atom comprises determining a quantizer based on a comparison between the atom and the replacement region (Zakhor: Fig. 4, step 96, the atom is processed after the pattern matching [step 68] is performed; column 6, lines 13-37, the coded residual signal is processed by the atom coder, wherein the atom coder performs quantization).

Re **claim 9**, Zakhor discloses that the predetermined criteria is determined based on a desired bit stream size (Zakhor: Fig. 4, step 94, the decision whether or not to continue pattern matching is based on the availability of bits).

**Claim 10** recites the corresponding apparatus for implementing the method of claim 1, and therefore claim 10 has been analyzed and rejected with respect to claim 1 above.

**Claim 10** recites the corresponding compute readable medium for implementing the method of claim 1, and therefore claim 10 has been analyzed and rejected with respect to claim 1 above.

### ***Conclusion***

3. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

- a. Dictionary generation method for video and image compression; Zakhor et al. (US 7003039 B2)
- b. Video encoding method based on the matching pursuit algorithm; Bottreau et al. (US 6625213 B2)
- c. Computer graphics; Clarke (US 7439970 B1)

### ***Contact***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to CHRISTOPHER FINDLEY whose telephone number is (571)270-1199. The examiner can normally be reached on Monday-Friday (8:30 AM-5:00 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marsha D. Banks-Harold can be reached on 571-272-7905. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Marsha D. Banks-Harold/  
Supervisory Patent Examiner, Art Unit 2621

/Christopher Findley/